

Electronic Supplementary Information

Fluorimetric and colorimetric analysis for total iron ions in blood or tap water using nitrogen-doped carbon dots with tunable fluorescence

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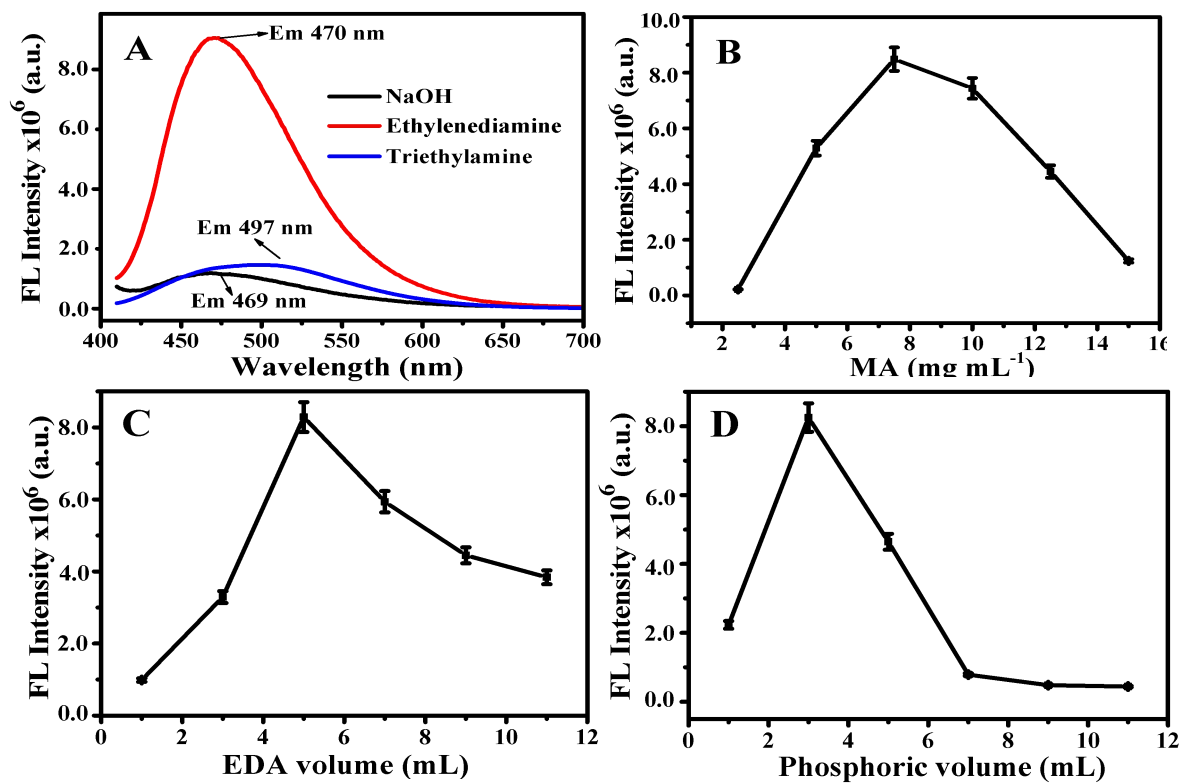


Fig. S1 (A) FL spectra ($\lambda_{\text{exc}} = 396 \text{ nm}$) of MA-derivatized N-Cdots (0.24 mg mL^{-1}) prepared using different alkaline precursors of EDA, NaOH (1.0 M), and triethylamine separately mixed with H_3PO_4 at the volume ratio of 5 / 3. Fluorescence intensities of N-Cdots prepared depending on the dosages of (B) MA, (C) EDA, and (D) phosphoric acid using 7.5 mg mL^{-1} MA.

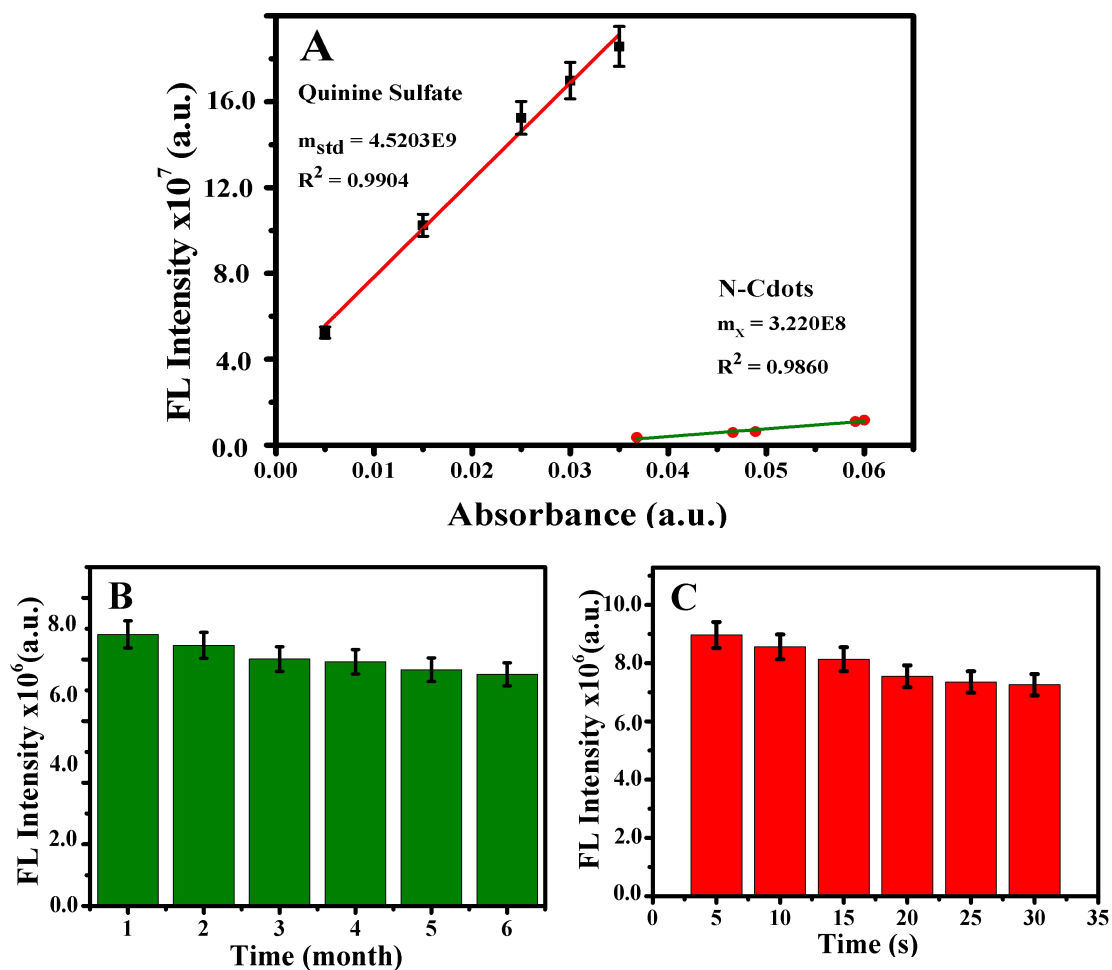


Fig. S2 (A) The plotting for the fluorescence intensities versus absorbance values of N-Cdots or quinine sulfate. (B) Environmental stability of N-Cdots (0.24 mg mL^{-1}) stored in water over different time intervals. (C) Photostability of N-Cdots (0.24 mg mL^{-1}) exposed under xenon lamp, of which the fluorescence intensities were recorded with exposure time indicated.

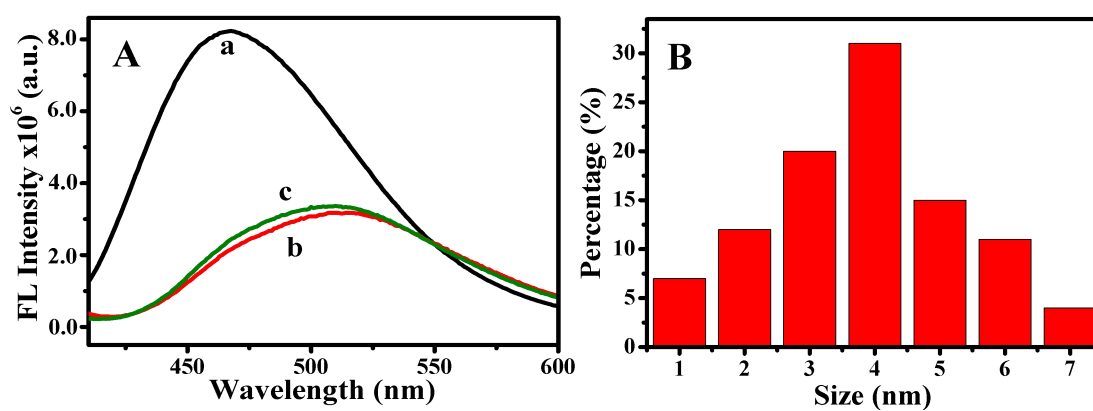


Fig. S3 (A) Comparison of fluorimetric spectra ($\lambda_{\text{ex}} = 396 \text{ nm}$) of N-Cdots (0.24 mg mL^{-1}) in the (a) absence and presence of (b) Fe^{3+} ions ($1.0 \mu\text{M}$) or (c) Fe^{3+} ions ($1.0 \mu\text{M}$) with Fe powder. (B) The size distribution of N-Cdots by dynamic light scattering analysis.

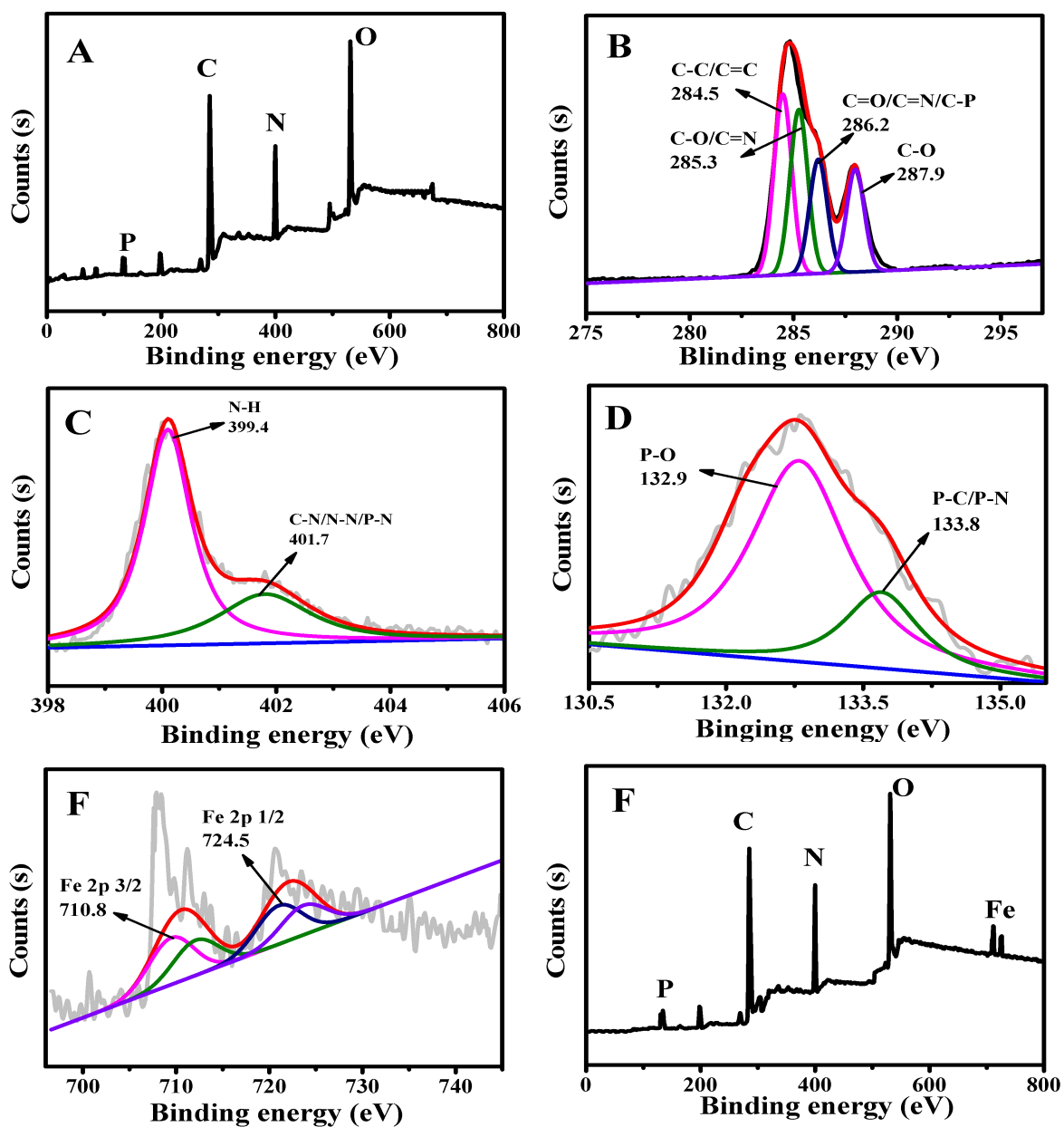


Fig. S4 X-ray photoelectron spectroscopy (XPS) spectra of the as-prepared N-Cdots without iron ions of (A) total elements, (B) C, (C) N, and (D) P; XPS spectra of the ones with iron ions of (E) iron element and (F) total elements.

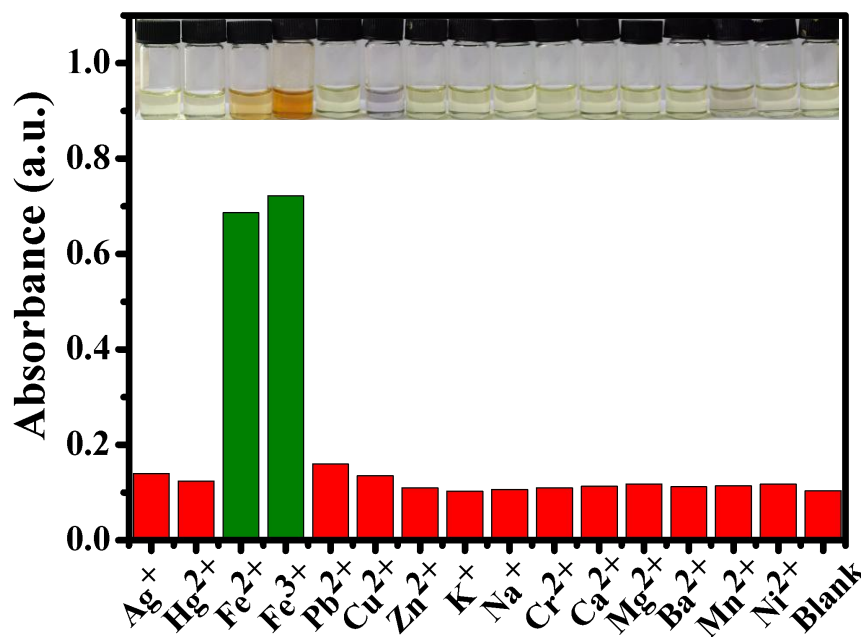


Fig. S5 Colorimetric responses of N-Cdots (0.24 mg mL^{-1}) to Fe^{2+} or Fe^{3+} ions ($1.0 \text{ }\mu\text{M}$) and other metal ions ($1.0 \text{ }\mu\text{M}$) indicated, with the corresponding photographs of the metal ion solutions (top) and the product solutions (bottom) under visible light.

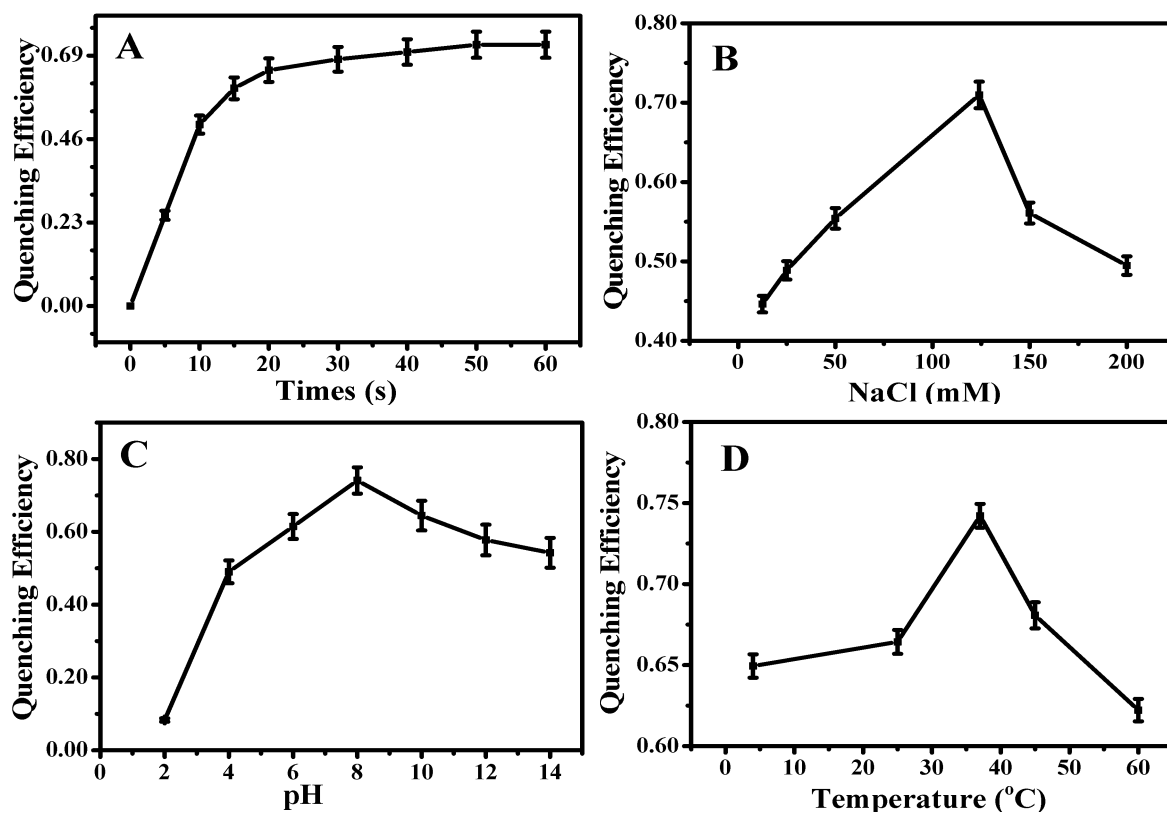


Fig. S6 Quenching efficiencies of N-Cdots in the presence of Fe^{3+} ions (1.0 μM) depending on (A) reaction time, (B) ion strengths in NaCl concentrations, (C) pH values (from 2.0 to 12), and (D) reaction temperature.

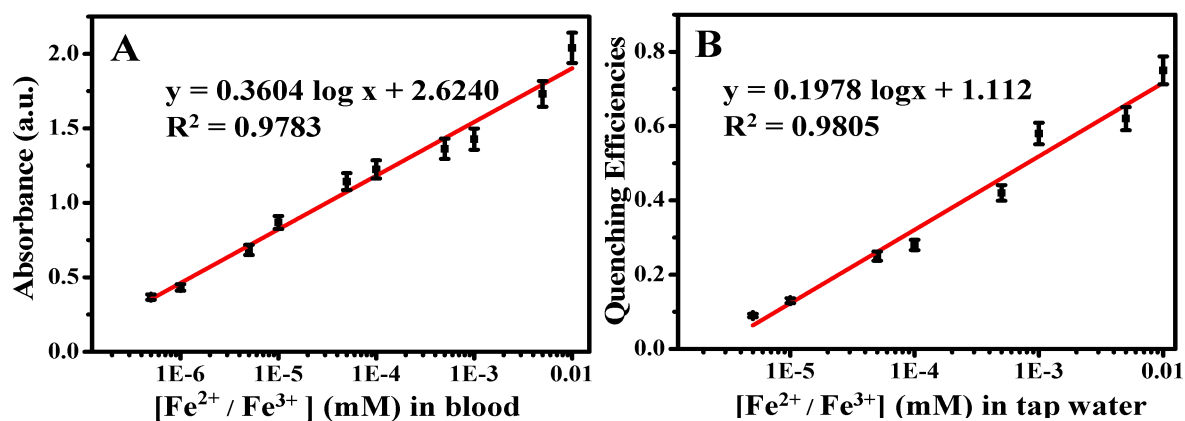


Fig. S7 The calibration detection curves of the N-Cdots-based (A) colorimetric and (B) fluorimetric analysis describing the relationship between absorbance values (A), or quenching efficiencies (B) the versus the concentrations of total Fe^{3+}/Fe^{2+} ions of different concentrations spiked in blood and tap water samples, respectively.

Table S1 Comparison of LODs among various fluorimetric analysis methods using different probes for detecting Fe³⁺ ions.

Fluorescent Probes	LODs	References
Aminoantipyrine	0.211 μM	Ref. 1
Pyrazoline derivative	1.4 μM	Ref. 2
Graphene quantum dots	0.020 μM	Ref. 3
Sulfur-doped graphene quantum dots	0.0042 μM	Ref. 4
N and S doped carbon dots	0.80 μM	Ref. 5
N-Cdots	0.0050 μM	This work

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